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IGDS/TRAP INTERFACE PROGRAM (ITIP),

SOFTWARE USER MANUAL (SUM)

September 18, 1981

Prepared for:

Coal Gasification Project Office
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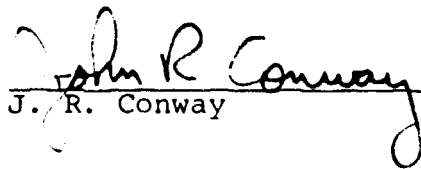
INTERGRAPH
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PREFACE

This report is the Software User Manual (SUM) for a Computer Program Contract End Item (CPCEI) identified as the IGDS/TRAP Interface Program (ITIP). Development of ITIP was performed by Intergraph Corporation as an add-on task under Contract No. NAS8-34279 for the Coal Gasification Project Office of George C. Marshall Space Flight Center (MSFC). The NASA COR for this contract is E. T. Deaton, Jr.

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LIST OF ACRONYMS

AS	Attribute Services
CPCEI	Computer Program Contract End Item
DDL	Data Definition Language
DEC	Digital Equipment Corporation
DMRS	Data Management and Retrieval
EDB	Edge Definition Block
FP	Floating Point
I	Integer
IGDS	Interactive Graphics Design System
ITIP	IGDS/TRAP Interface Program
NDB	Node Definition Block
PDB	Project Definition Block
PDP	Programmable Data Processor
RAB	Resource Activity Block
RDB	Resource Definition Block
SDD	Software Design Document
TRAP	Time-Line and Resources Analysis Program
UIC	User Identification Code

1. SCOPE

This specification establishes the requirements, concepts and preliminary design for a set of software known as the IGDS/TRAP Interface Program (ITIP). This software will provide the capability to develop at an Interactive Graphics Design System (IGDS) design station process flow diagrams for use by the NASA Coal Gasification Task Team. In addition, ITIP will use the Data Management and Retrieval System (DMRS) to maintain a data base from which a properly formatted input file to the Time-Line and Resources Analysis Program (TRAP) can be extracted. This set of software will reside on the PDP-11/70 in Building 4487, MSFC and will become the primary interface between the Coal Gasification Task Team and IGDS, DMRS and TRAP.

2. APPLICABLE DOCUMENTS

- IGDS8 Application Software Interface Document, 79-076, Rev. B, Intergraph Corporation, November, 1980.

- IGDS Operating Manual (IGDS8), 79-067, Rev. B, Intergraph Corporation, March 1981.

- Graphics Standard Interchange Format, 80-021, Intergraph Corporation, May, 1980.

- DMRS 8.0 HOL Control Block (CB) User's Guide, 79-031, Rev. A, Intergraph Corporation, July 1980.

- DMRS 8.0 HOL User's Guide, 80-124, Intergraph Corporation, April 1980.

- DMRS Data Definition Language (DDL) Compiler, Internal Report No. 79-050, Rev. B, Intergraph Corporation, January 1981.

- DMRS8 Command Language User Guide, 79-065, Rev. B, Intergraph Corporation, February 1981.

3. IGDS/TRAP (ITIP) USER PROCEDURES

Before the user can use ITIP to design a network flow diagram, he must log onto the system. The system then provides the network designer a complete environment which makes user options (commands) available to aid in his work. A custom-tailored interactive alphanumeric dialogue is provided to guide the user through selection of the ITIP user options. This section describes the following functions which are required to use the capabilities of ITIP:

- Logging on

- Invoking ITIP

- Creating a design file

- Initializing the data base

- Selecting user options

- Logging off

3.1 Logging On

Before logging on the user must assure that the ITIP FORTRAN tasks which support the ITIP user commands are installed. This is done by keying in (each command keyed in must be followed by a <carriage return>);

```
INS  QS2:  [50,2] ITIP
INS  QS2:  [50,2] IEXT
```

at the PDP 11/70 operator's console. If the tasks have already been installed (i.e., the system has not been rebooted since the last use of ITIP), messages indicating that the task names are already in use will be displayed.

To log on, the user first keys in HELLO. The system will also accept the first three characters of the word for a shorter method (i.e., EL). This informs the system that the user is ready to work on that station. Next, the system asks the user for identification by means of his ACCOUNT or NAME. This reply can either be the User Identification Code (UIC) or another pre-established account name. Then, the system prompts the user for a PASSWORD, which has also been predetermined. The password is not visually displayed on the screen as the data is keyed in. This is part of the system's security precautions. Currently, the UIC is [50,2], the account name is DEATON, and the password is ITIP.

Examples:

```
>HEL
ACCOUNT OR NAME:  DEATON
PASSWORD:  ITIP


                   OR


>HEL
ACCOUNT OF NAME:  50,2
PASSWORD:  ITIP


                   OR


>HEL DEATON/ITIP
```

Once the user has successfully keyed in the password, the system acknowledges acceptance with a welcome message:

```
RSX-11M-PLUS V01 BL6     MULTI-USER [14,5] SYSTEM

GOOD MORNING
11-AUG-81 07:40   LOGGED ON TERMINAL TT1
```

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3.2 Invoking ITIP

After logging on successfully, the system displays the following messages and prompts the user to choose the desired IGDS subsystem.

```
>@LOGIN.CMD
>; ***** INTERACTIVE *** GRAPHICS *** DESIGN *** SYSTEM ****
>;    WHAT DO YOU WANT TO USE -
>;    UTILITIES, GRAPHICS, EDIT, DMRS, HELP, BYE
>*    ? [S]:
```

The user should choose GRAPHICS by typing in GRAPHICS, or the first three letters GRA. The system responds by prompting the user for a design file name:

```
>*  WHAT IS THE NAME OF YOUR DESIGN FILE? [S]
```

The user's file name must corform to the file name format. The file name, which is analogous to the address on a letter, is constructed of six parts and six marks of punctuation. The following is an example of file name format. The letters represent the parts and not the specifics.

```
DDD:[GRO,USR]NNNNNNNNN.EXT;VER
```

Remember that the number of letters per part shows the maximum permissible entries. However, this does not mean that each position has to be filled. The following is an explanation of the previously given example file name format:

DDD: Refers to the disk drive you intend to use (default is QS2:)

[GRO,   Refers to the group identification (default is 50) drafting shop or discipline, and can be a maximum of three digits, octal to 377.

USR]   Refers to the user identification (default is 2).

NNNNNNNN. Refers to the name of the user file. You may not use spaces or punctuation between the closure bracket and the period after the name (up to nine alphanumeric characters).

EXT;   Refers to the type of a file you are establishing. Use DGN to signify a design file.

VER   Refers to version numbers. Version numbers
             permit you to have more than one design file
             with the same name. The version numbers are
             octal up to four digits.

     ITIP does not support multiple version numbers, since there
can only be one active DMRS data base definition, and the design
file must correspond to that data base definition. For this
reason, the user should maintain a single version of the net-
work design file. A sample design file specification might be:

     QS2: [50,2] TESTFILE.DGN;1

which results in IGDS being activated with the design file
TESTFILE.DGN;1 opened for storage of graphic data.

The operator may bypass the design file prompt by entering all
required information on the same command line that activates
GRAPHICS.

     GRAPHICS,QS2:[50,2]TESTFILE.DGN;1

The detailed descriptions of capabilities provided by the GRAPHICS
subsystem are presented in the following sections of this
document. Only the first three characters of a subsystem name
are required to activate the subsystem, but more may be used.
The system can also default the disk device and UIC provided
the operator logged on under the ITIP UIC (50,2). The version
will automatically default to the most recent version created.

Examples:

     GRA,TESTFILE.DGN

     or

     GRAPHICS, TESTFILE.DGN

     After the user has successfully activated the IGDS
graphics subsystem with the specified design file, the ITIP
program must be invoked. This is accomplished by keying in:

     UC = QS2:[50,2] ITIP

This will result in the screens being updated to display the
master level network design space for the specified design
file. The message header on the right-hand screen will display
the messages PROMPT and ENTER OPTION MNEMONIC in the command
and prompt fields. ITIP is now active and the user is
ready to begin the network design session. Section 3.5
describes the ITIP user options available to the network
designer.

3.3 Creating a Design File

The user must have a file area set aside on a disk drive
to fill with data. If he does not have an existing file, he
can create one. To do this he must first log onto the system
as described in Section 3.1. The prompt to choose the desired
IGDS subsystem will be displayed.

```
>;***** INTERACTIVE *** GRAPHICS *** DESIGN *** SYSTEM *****
>;   WHAT DO YOU WANT TO USE -
>;   UTILITIES, GRAPHICS, EDIT, DMRS, HELP, BYE
>*   ? [S]:
```

The user selects the utilities subsystem by keying in UTI,
and the system responds with:

```
>; WHICH UTILITY WOULD YOU LIKE TO USE -
>; COPY, CREATE, DELETE, DIRECTORY, HELP, INCREASE,
   REDUCE/ENTER
>* ?[S]:
```

Since he intends to create a new file, the CREATE option is
selected by keying in "CRE" and the system prompts with:

```
>*WHAT IS THE NAME OF THE NEW DRAWING?
```

The user's file name must conform to the file name format
described in Section 3.2. If the user specifies the file
name correctly, the system responds with the prompt:

```
>* 2D OR 3D [S]:
```

The user must specify 2D. The system responds with the prompt:

```
>* HOW LARGE SHOULD IT BE? [S]:
```

(If the user does not receive this reply, he must carefully
examine his file name designation for violations of the format
and try it again.)

By asking him HOW LARGE IT SHOULD BE, the system accepted
his file name and the computer now wants to know how much area
he wants to set aside for himself, specifically a quantity
of blocks. The user may specify a number based on past experience
or a reasonable first estimate might be 200. If the estimate
should prove inadequate the user may use the utilities subsystem
to INCREASE the design file size when necessary. After specify-
ing the size of the file, the following message is displayed
on the screen:

```
SYSTEM SEEDFILE WILL BE USED
SUCCESSFUL COMPLETION
```

The user now knows he has correctly created a design file, and it is now available to him.

In addition to creating this design file, the user must initialize the ITIP DMRS data base. Section 3.4 describes the procedures for creating a data base definition file and initializing the data base. During an ITIP design session data entries are made to both the design file and the DMRS data base; therefore, it is imperative that these files be created at the same time and maintained at the same level (version number) until completion of the network design (regardless of the number of design sessions required).

3.4 Initializing the Data Base

A data base is created by running the Data Definition Language (DDL) compiler. The DDL compiler processes a set of statements and builds a database according to the contents of each statement. An input file for the DDL compiler which defines the database structure necessary for the ITIP is included with the ITIP software package (Figure 3.4-1). This basic file, named COLGAS.DDL, can be modified, within limits, to accommodate arbitrary numbers of RDB's, EDB's, RAB's, or NDB's. Considerations for choosing the numbers of RDB's, EDB's, RAB's or NDB's can be found in appendix C. These modifications can be accomplished by editing file COLGAS.DDL and changing the number to the right of 'OCC =' for the RDB's, EDB's, RAB's or NDB's. The number to the right of the 'OCC=' for the PDB should not be changed since only one PDB can exist for a given project.

After the COLGAS.DDL file has been tailored to the users need, a database can be created by keying in:

>DDL @DDD:[GGG,UUU]COLGAS.DDL

where DDD is the device specification and GGG,UUU is the UIC specification which identifies where the COLGAS.DDL file is located. If the database is created successfully the message 'DDL STOP' will be displayed. If an error occurs it will be indicated by the message displayed. A more detailed explanation of the error can be found in the print file (DBS.PRT) which is generated when the DDL compiler is executed.

This procedure will create a database named 'COLGAS' in the users account. For a more detailed explanation of the statements contained in the COLGAS.DDL file or of the general procedure for creating a database, reference the DMRS Data Definition Language (DDL) Compiler document.

It should be noted that the database files and the IGDS design files used with ITIP are associated. It is required that the user initialize both the database and IGDS files using the procedures in this section and section 3.3 at the beginning of each new network design. It is also required that they only be manipulated through the use of the ITIP.

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```
PRINT = 'DBS.PRT'
DB = 'COLGAS.DB'
NAME = 'COLGAS'
/

   1.   PDB      P = 0           DF = 'PDB.ENT'        OCC = 2

                .1  P_TITLE      F=AN(30)          ; PROJECT TITLE
                .2  N_ID         F=AN(4)           ; NETWORK ID
                .3  N_TITLE      F=AN(30)          ; NETWORK TITLE
                .4  N_LEVEL      F=I(16)           ; NETWORK LEVEL
                .5  S_TIME       F=F               ; NETWORK START TIME
                .6  U_TIME       F=AN(8)           ; TIME UNITS
                .7  N_DURATION   F=F               ; NETWORK DURATION
                .8  EX_INDEX     F=I(9999)         ; NODE EXPANSION
                                                     INDEX

   2.   RDB      P = 1           DF = 'RDB.ENT'        OCC = 50

                .1  R_ID         F=AN(2)           ; RESOURCE ID
                .2  R_DESC       F=AN(24)          ; RESOURCE DESCRIPTION
                .3  R_FLAGS      F=I(10)           ; RESOURCE FLAGS
                .4  R_CONST      F=F               ; RESOURCE CONSTRAINTS
                .5  R_INIT_QTY   F=F               ; RESOURCE INITIAL QUANTITY
                .6  R_FUNC       F=I(10)           ; FUNCTION INDEX

   3.   NDB      P = 1           DF = 'NDB.ENT'        OCC = 2400

                .1  ND_ID        F=I(9999)         ; NODE ID
                .2  ND_DESC      F=AN(24)          ; NODE DESCRIPTION
                .3  ND_SHF_FAC   F=I(10)           ; NODE SHIFT FACTOR
                .4  ND_FLAGS     F=I(10)           : FLAGS
                .5  ND_DUR       F=F               ; NODE DURATION
                .6  ND_NUM_RABS  F=I(12)           ; NO. OF RABS FOR NODE
                .7  ND_LEV       F=I(8)            ; NODE LEVEL
                .8  ND_PAREN     F=I(9999)         ; NODES PARENT
                .9  ND_XUR       F=I(2147000000)   ; NODE CENTER XUR
                .10 ND_YUR       F=I(2147000000)   ; NODE CENTER YUR

   4.   EDB      P = 1           DF = 'EDB.ENT'        OCC = 1000

                .1  E_ID         F=AN(4)           ; EDGE ID
                .2  E_PRED       F=I(9999)         ; EDGE PREDESESSOR
                .3  E_SUCC       F=I(9999)         ; EDGE SUCCESSOR
                .4  E_PAREN      F=I(9999)         ; PAREN OF THIS EXPANSION

   5.   RAB      P = 3           DF = 'RAB.ENT'        OCC = 1000

                .1  RA_ID        F=AN(2)           ; RESOURCE ACTIVITY B ID
                .2  RA_CODE      F=AN(1)           ; RESOURCE ACTIVITY CODE
                .3  RA_QTY       F=F               ; QUANTITY
                .4  RA_PAREN     F=I(9999)         ; NODE WHICH OWNS RAB
                .5  EX_PAREN     F=I(9999)         ; EXPANSION PARENT

        END
```

Figure 3.4-1

3.5 Selecting User Options

User interaction under IGDS is provided in two ways. Messages to the user are placed in the refresh header. User input may be via keyboard entry or by use of the multibutton cursor. ITIP usage of these facilities are described in this section.

The refresh header is displayed on the right-hand screen during ITIP operation. This header is made up of four refresh message fields which appear at the top of the display. These four fields are maintained in a non-storing write through mode to indicate constantly changing conditions and system status without interfering with the drawing being generated. The four refresh fields are described (from left to right) in the following listing:

- Command Field - This refresh field keeps the user informed of the current command mode of operation; i.e., the ITIP user option being executed. Once a command is selected, the system accepts the command as the "active command" and remains in the selected command mode until completion of that command. For example, the PLACE NODE command can be selected and a node can be placed.

- Prompt Field - This refresh field is used to respond to every user input with a definition of the next operation expected by the system. For example, a PLACE NODE command selection will prompt the user with the request SELECT NODE CENTER. On commands which require multiple inputs and a series of prompt messages, the Reset/Reject cursor button can be used to exit the command and return to the option selection mode.

- Input/Error Field - This refresh field serves two purposes: keyboard inputs are composed in this field and displayed to the user for validation and editing, and error messages are presented in this field to inform the user of illegal inputs or operations.

- Status Field - This refresh field is used to reflect the current status of the "active command" and to display the current value of ITIP variables whenever applicable.

The multibutton cursor is used for selecting graphic elements and defining locations on the display. There are four lettered buttons on the cursor which are predefined as follows:

- Command Button (C) - The top-left button on the cursor is used to select commands. ITIP does not use this button and it should not be depressed during ITIP operation.

- Data Button (D) - The top-center button serves as an X,Y point button when the Design Plane Display is active. To enter an X,Y point by the cursor, the user moves the cursor until the tracking symbol is located at the correct screen position. When the user presses the X,Y point button, the associated input coordinate data is sent to the appropriate graphic utility routine.

- Reset/Reject Button (R) - The right-top button serves both as a command reset button and a reject button. The user may reject the current option and reset to the option selection mode. On options that prompt for data base entries via keyboard, the reject button may be used to reject the prompt and retain the current value.

- Tentative Point Button (T) - The center button in the second row is used as a trial or tentative point button. When the button is pressed, a nonstoring cross is displayed on the screen at the location defined by the associated input coordinate. The input data point is not transmitted to the graphic generation software. Its position is merely reflected to the user for examination and possible acceptance. If the point location is not satisfactory, the user may define another trial point by another tentative point button input. When the input tentative point is satisfactorily positioned, the user may accept the point and have it transmitted to the graphic software by using the X,Y point button to signal acceptance of the point. The input coordinate associated with the X,Y point button is replaced by the outstanding tentative point coordinate. The outstanding tentative point coordinates may be cleared by the Reset/Reject button.

The user options which are made available to the network
designer by the ITIP software are listed in Table 3.5-1.
The following subsections describe each of these options in detail.
For each option the name, mnemonic, description, and a detailed
procedure for its usage are provided. Appendix A contains a
summary of the user options and expected responses. After an
initial reading of this section, it is to serve as a reference
manual. Appendix A will the.. serve as a quick reference to
the user options and a guide to user responses. Each of the
user options is selected by keying in the two-character
mnemonic when in the prompt mode. The prompt mode is the normal
state of ITIP and is denoted by the messages PROMPT and ENTER
OPTION MNEMONIC being displayed in the command and prompt fields.

3.5.1 Place Node

Mnemonic: PN

Description: This user option allows the network designer to
place a node in the network process flow diagram at a specific
user defined location. Entries are made in the design file and
the ITIP data base to support the node definition.

Procedure: The command and prompt fields will display PLACE
NODE and SELECT NODE CENTER, respectively. The cursor is now
active, and the user should place the cursor at the desired
location of the node center. Depressing the data button results
in an ellipse (the IGDS graphic element used for a node) being
placed at that location.

This will result in the prompt ENTER LINE 1 (15 characters).
Next, enter the first line of text using the keyboard. The
text is echoed in the input/error field in the display header,
can be corrected via the rubout key, and entered by depressing
the return key. The text is limited to 15 characters per
line, and at least one blank must be entered if a blank line is
desired. After entering the first line, the second line is
entered in the same manner and the description is displayed in
the node.

The prompt ENTER THE SHIFT FACTOR (I) is displayed. The
user should enter a one digit integer to specify the shift factor.
The prompt ENTER NODE DURATION (FP) is displayed. The user should
then enter a decimal (floating point) value which specifies the
duration of the node in the network time units.

The values of the specified node description variables are
entered in the Node Definition Block (NDB) portion of the ITIP
data base, and the node is labeled with the letter A to note
successful attachment of the data base prototype to the
graphic element. The user may continue to place nodes in the
sequence of events outlined above. To exit PLACE NODE, depress
the reset cursor button when the SELECT NODE CENTER prompt is
displayed.

INDEX	MNEMONIC	OPTION
1	PN	Place Node
2	PE	Place Edge
3	DN	Delete Node
4	DE	Delete Edge
5	DR	Define Resource
6	MR	Modify Resource
7	UP	UPdate drawing
8	MN	Modify Node description
9	SP	Specify Project description
10	MP	Modify Project description
11	SF	Submit TRAP File
12	ZI	Zoom In
13	ZO	Zoom Out
14	WC	Redefine Window Center
15	DC	Default Window Center
16	EX	EXpand node
17	PL	Return to Previous Level
18	ML	Return to Master Level
19	DA	Define resource Activity
20	MA	Modify resource Activity
21	STOP	Terminate ITIP

Table 3.5-1 ITIP User Options

3.5.2 Place Edge

Mnemonic: PE

Description: This user option allows the network designer to place an edge in the network process flow diagram which will connect a specific predecessor node to a specific successor node. Entries are made in the design file and the ITIP data base to support the edge definition.

Procedure: The command and prompt fields will display PLACE EDGE and SELECT PREDECESSOR NODE, respectively. The cursor is now active and the user should place the cursor at the desired connection point on the predecessor node. Depressing the data button results in a status field display reflecting either PREDECESSOR SELECTED or the error message NOT A NODE.

When the predecessor node has been successfully identified, the prompt SELECT SUCCESSOR NODE is displayed. The cursor is now active and the user should place the cursor at the desired connection point on the successor node. Depressing the data button results in a status field display reflecting either SUCCESSOR SELECTED or the error message NOT A NODE.

When the successor node has been successfully identified, values are entered into the Edge Definition Block (EDB) portion of the ITIP data base, and the edge is labeled with the letter A to note successful attachment of the data base prototype to the graphic element. The user may continue to place edges in the sequence of events outlined above. To exit PLACE EDGE, depress the reset cursor button when the SELECT PREDECESSOR NODE or SELECT SUCCESSOR NODE prompt is displayed.

3.5.3 Delete Node

Mnemonic: DN

Description: This user option allows the network designer to delete the graphic element (ellipse) and data base linkage associated with a node from the network process flow diagram.

Procedure: The command and prompt fields will display DELETE NODE and SELECT NODE, respectively. The cursor is now active, and the user should place the cursor near the center of the node to be deleted. Depressing the data button results in the node being flashed and the status message NODE SELECTED displayed. The text and ellipse are marked for deletion as denoted by the placement of the letter D. The data base linkage for that node is then deleted. Subsequent screen update will verify that the node has been removed.

The user may continue to delete other nodes in a similar manner. To exit DELETE NODE, depress the reset cursor button.

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3.5.4 Delete Edge

Mnemonic: DE

Description: This user option allows the network designer to
delete the graphic element (line and arrowhead) and data base
linkage assocated with an edge from the network process flow
diagram.

Procedure: The command and prompt fields will display DELETE
EDGE and SELECT EDGE, respectively. The cursor is now active,
and the user should place the cursor near the edge to be deleted.
Depressing the data button results in the edge being flashed and
the status message EDGE SELECTED displayed. The line is marked
for deletion as denoted by the placement of the letter D.
The data base linkage for that edge is then deleted. Subseqrent
screen update will verify that the edge has been removed.

The user may continue to delete other edges in a similar
manner. To exit DELETE EDGE, depress the reset cursor button.

3.5.5 Define Resource

Mnemonic: DR

Description: This user option allows the network designer to define
a resource by specifying values for the entries in the Resource
Definition Block (RDB) portion of the ITIP data base.

Procedure: The command and prompt fields will display RESOURCE
DEFINITION and ENTER RESOURCE ID (2 characters), respectively.
The user should respond by keying in a unique two character
resource identification. The prompt ENTER RESOURCE DESC
(24 characters) is then displayed. The user should respond
by keying in the resource description (24 characters or less).
The prompt ENTER RES CONSTRAINTS (FP) is then displayed. The
user should respond by keying in a decimal (floating point) value
which specifies the constraint of this resource.

The prompt ENTER INITIAL QUANTITY (FP) is then displayed.
The user should respond by keying in a decimal value which
specifies the initial quantity of this resource. The prompt
ENTER RESOURCE FLAGS (I) is then displayed. The user should
respond by keying in an integer specifying the settings of
the resource flags. The prompt ENTER RESOURCE FUNCTION (I)
is then displayed. The user should respond by keying in an
integer specifying the value of the resource function.

This completes the definition of entries in the Resource
Definition Block (RDB). The values entered are stored in the
RDB portion of the ITIP data base, and control is returned to
the prompt mode. Since the values entered are not stored in
the data base until all have been specified, the user may
abort the RESOURCE DEFINITION option by depressing the reset
cursor button in response to any of the prompts.

3.5.6 Modify Resource

Mnemonic: MR

Description: This user option allows the network designer to
modify values for the entries in the Resource Definition
Block (RDB) portion of the ITIP data base.

Procedure: The command and prompt fields will display MODIFY
RESOURCE and ENTER RESOURCE ID (2 characters), respectively.
The user should respond by keying in the two-character
identification of the resource to be modified. If the resource
identification cannot be found in the RDB portion of the ITIP
data base the error field will display RESOURCE NOT FOUND, and
control will be returned to the prompt mode.

The prompt ENTER RESOURCE DESC (24 characters) is displayed,
and the current description is displayed in the status field.
If the user does not wish to change the description, he may
depress the reset cursor button. To change the description, the
user should key in the new description (24 characters or less).

The prompt ENTER RES CONSTRAINTS (FP) is displayed, and
the current value is displayed in the status field. The user
may retain the current value by depressing the reset cursor button,
or he may key in a replacement decimal value.

The prompt ENTER INITIAL QUANTITY (FP) is displayed, and
the current value is displayed in the status field. The user
may retain the current value by depressing the reset cursor
button, or he may key in a replacement decimal value.

The prompt ENTER RESOURCE FLAGS (I) is displayed, and the
current value is displayed in the status field. The user may
retain the current value by depressing the reset cursor button,
or he may key in a replacement integer value.

The prompt ENTER RESOURCE FUNCTION (I) is displayed,
and the current value is displayed in the status field. The
user may retain the current value by depressing the reset
cursor button, or he may key in a replacement integer value.

This completes modification of the RDB portion of the ITIP
data base, and control is returned to the prompt mode.

3.5.7 Update Drawing

Mnemonic: UP

Description: This user option allows the network designer to
force an update of both screens. Any nodes or edges which had
been marked for deletion are removed, and the A's which identify
nodes and edges which have been attached to the data base are
removed.

Procedure: No additional user responses are required by this
option.

3.5.8 Modify Node Definition

Mnemonic: MN

Description: This user option allows the network designer to
modify values for the entries in the Node Definition Block
(NDB) portion of the ITIP data base.

Procedure: The command and prompt fields will display MODIFY NODE
DESCRIP. and IDENTIFY NODE FOR CHANGE, respectively. The
cursor is now active, and the user should place the
cursor near the center of the node to be modified. Depressing
the data button results in the node being flashed, the text
being marked for deletion, and the values of the entries in the
NDB being displayed on the left-hand screen. Depressing the
cursor reset button returns to the prompt mode.

The prompt ENTER LINE 1 (15 CHARS.) is displayed. The
user should respond by keying in the first line of the node
description (15 characters or less). If the user does not
wish to change either line of the node description, he may
retain the current description by depressing the cursor
reset button. If the user desires to change the second
line but not the first, he must reenter the first line. The
prompt ENTER LINE 2 (15 CHARS.) is then displayed. The user
should respond by keying in the second line of the node
description (15 characters or less). If either line is to
be blank, then at least one space character must be entered.
The total number of characters in the two lines must not
exceed 24, including a trailing blank on line one.

After both lines are entered or the cursor reset button is
depressed, the prompt ENTER THE SHIFT FACTOR (I) is displayed.
The user should respond by keying in a one digit integer to
specify the shift factor. The user may retain the current
value by depressing the cursor reset button.

The prompt ENTER NODE DURATION (FP) is then displayed. The
user should respond by keying in a decimal (floating point) value
which specifies the duration of the node in the network time
units. The user may retain the current value by depressing the
cursor reset button.

The values of the modified node description variables are entered in the NDB portion of the ITIP data base. The node is labeled with the letter A to denote successful attachment of the revised data base prototype to the graphic element, and control is returned to the prompt mode.

3.5.9 Specify Project Definition

Mnemonic: SP

Description: This user option allows the network designer to define the project by specifying the values of entries in the Project Definition Block (PDB) portion of the ITIP data base.

Procedure: The command and prompt fields will display SPECIFY PROJECT DESC and ENTER PROJECT TITLE (30 CHAR), respectively. The user should respond by keying in the desired project description (30 characters or less). The prompt ENTER NETWORK ID (4 CHAR) is then displayed. The user should respond by keying in the desired four-character network identification. The prompt ENTER NETWORK TITLE (30 CHAR) is then displayed. The user should respond by keying in the desired network title (30 characters or less).

The prompt ENTER START TIME (FP) is displayed. The user should respond by keying in a decimal (floating point) value which specifies the initial time for the network in the network time units. The prompt ENTER UNITS OF TIME (8 CHAR) is then displayed. The user should respond by keying in the desired units of time for the network (8 characters or less). The prompt ENTER DURATION (FP) is then displayed. The user should respond by keying in a decimal (floating point) value which specifies the duration of the network in the network time units specified previously. At this point values for all entries in the PDB portion of the ITIP data base have been entered, and control is returned to the prompt mode.

3.5.10 Modify Project Definition

Mnemonic: MP

Description: This user option allows the network designer to modify the values of the entries in the Project Definition Block (PDB) portion of the ITIP data base.

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Procedure: The command and prompt fields will display MODIFY
PROJECT DESCR and ENTER PROJECT TITLE (30 CHAR), respectively.
The current project title is displayed in the status field.
The user may retain the current project title by depressing
the cursor reset button, or he may key in a replacement
title (30 characters or less).

The prompt ENTER NETWORK ID (4 CHAR) is displayed, and
the current network identification is displayed in the status
field. The user may retain the current network identification
by depressing the cursor reset button, or he may key in a
replacement four-character identification.

The prompt ENTER NETWORK TITLE (30 CHAR) is displayed,
and the current network title is displayed in the status field.
The user may retain the current title by depressing the
cursor reset button, or he may key in a replacement title
(30 characters or less).

The prompt ENTER START TIME (FP) is displayed, and the
current value of the initial time for the network is displayed
in the status field. The user may retain the current start
time by depressing the cursor return button, or he may key in
a replacement decimal (floating point) value.

The prompt ENTER UNITS OF TIME (8 CHAR) is displayed, and
the current network time units specification is displayed in
the status field. The user may retain the current time unit
specification by depressing the cursor reset button, or he
may key in a replacement time unit (8 characters or less).

The prompt ENTER DURATION (FP) is displayed, and the
current network duration in network time units is displayed
in the status field. The user may retain the current network
duration value by depressing the cursor reset button, or he
may key in a replacement decimal (floating point) value. At
this point any user changes have been made to the PDB portion
of the ITIP data base, and control is returned to the prompt
mode.

3.5.11 Submit TRAP File

Mnemonic: SF

Description: This user option allows the network designer to
request that a TRAP input file be generated from the entries
in the ITIP data base and submitted to the Honeywell 560 via
the PDP/Honeywell interface.

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Procedure: The user should display the network or sub-network for which a file is to be extracted and submitted, using the ITIP commands. Once the network or sub-network is displayed the 'SF' command should be entered. At the completion of this process ITIP will prompt for another command. If any error occurs it will be displayed in the error message field.

3.5.12 Zoom In

Mnemonic: ZI

Description: This user option allows the network designer to zoom in the right-hand screen on the current design space.

Procedure: No additional user responses are required by this option. This option is limited to the default level of the design space. Attempts to zoom in beyond this level are not useful. The error message CANNOT ZOOM PAST THIS LEVEL is displayed, and further zooming in is inhibited.

3.5.13 Zoom Out

Mnemonic: ZO

Description: This user option allows the network designer to zoom out the right-hand screen on the current design space.

Procedure: No additional user responses are required by this option. This option is limited to two zooms. The right-hand screen is then at the same level as the left-hand screen, and additional zooms would be of little value to the user. The error message CANNOT ZOOM MORE THAN TWICE is displayed, and further zooming out is inhibited.

3.5.14 Redefine Window Center

Mnemonic: WC

Description: This user option allows the network designer to redefine the center of the window into the current design space as displayed on the right-hand screen.

Procedure: The command and prompt fields will display DEFINE WINDOW CENTER and SELECT CENTER POINT, respectively. The cursor is now active, and the user should position the cursor to point to the desired center point. Depressing the data button results in the right-hand screen being updated to reflect the orientation as redefined.

3.5.15 Default Window Center

Mnemonic: DC

Description: This user option allows the network designer to reset the right-hand screen orientation to reflect the default center of the current design space.

Procedure: No additional user responses are required by this option.

3.5.16 Expand Node

Mnemonic: EX

Description: This user option allows the network designer to display the lower level design space which contains the subprocess network expansion of a node.

Procedure: The command and prompt fields will display EXPAND NODE and SELECT NODE, respectively. The cursor button is now active, and the user should position the cursor near the center of the node to be expanded. Depressing the data button results in setting the parameters for the design space which contains the subprocess network expansion of that node and updating both screens to display that design space. Control is returned to the prompt mode.

3.5.17 Return to Previous Level

Mnemonic: PL

Description: This user option allows the network designer to display the higher level design space which contains the node which was expanded to give the current design space display.

Procedure: No additional user responses are required by this option. If the user attempts to execute this option from the master level (highest level) design space the error message CANNOT RETURN FROM MASTER LEVEL is displayed. Control is returned to the prompt mode.

3.5.18 Return to Master Level

Mnemonic: ML

Description: This user option allows the network designer to return from any lower level design space to the display of the master level (highest level) design space.

Procedure: No additional user responses are required by this option.

3.5.19 Define Resource Activity

Mnemonic: DA

Description: This user option allows the network designer to define a resource activity, specify values for the entries in the Resource Activity Block (RAB) portion of the ITIP data base, and logically connect that resource activity to a node in the current design space.

Procedure: The command and prompt fields will display DEF RES ACT BLOCK and ENTER RES ACT ID (2 CHAR), respectively. The user should respond by keying in a unique two-character resource identification which is defined by an entry in the Resource Definition Block (RDB) portion of the ITIP data base. The user may return to the prompt mode by depressing the cursor reset button.

After the resource identification has been entered, the prompt ENTER RES ACT CODE (I) is displayed. The user should enter a one-digit integer which specifies the value of the resource activity code. The prompt ENTER RES QUANTITY (FP) is then displayed. The user should respond by keying in a decimal (floating point) value which specifies the quantity of the network resource that this activity will require.

The prompt POINT TO NODE is displayed. The cursor is now active, and the user should position the cursor near the center of the node to which this resource activity is to be logically connected. Depressing the cursor button results in the node being flashed and the values for the entries in the Resource Activity Block (RAB) being entered in the RAB portion of the ITIP data base. The user may also reject all values entered to this point and return to the prompt mode without making entries in the RAB by depressing the cursor reset button. Control is returned to the prompt mode.

3.5.20 Modify Resource Activity

Mnemonic: MA

Description: This user option allows the network designer to modify the values of the entries in the Resource Activity Block (RAB) portion of the ITIP data base.

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Procedure: The command and prompt fields will display
MODIFY RES ACT BLOCK and ENTER RES ACT ID (2 CHAR),
respectively. The user should respond by keying in a unique
two-character identification which is defined in the Resource
Definition Block (RDB) and the Resource Activity Block
(RAB) portions of the ITIP data base. The user may return to
the prompt mode by depressing the cursor reset button.

After the resource identification has been entered,
the prompt SELECT NODE is displayed. The cursor is now active,
and the user should position the cursor near the center of the
node which is logically connected to the resource activity
which is to be modified. Depressing the data button
results in the node being flashed, and the RAB portion of the
ITIP data base is searched for an occurrence of the resource
identification connected to that node. If no occurrence
is found, the error message RES ACT NOT FOUND is displayed
and control is returned to the prompt mode. The user may
also exit this option and return to the prompt mode by
depressing the cursor return button.

After the resource identification and the logically
connected node for this resource activity have been selected,
the prompt ENTER RES ACT CODE (I) is displayed. The current
value of the resource activity code is displayed in the status
field. The user may retain the value by depressing the
cursor reset button, or he may key in a replacement one-digit
integer.

The prompt ENTER RES QUANTITY (FP) is displayed, and the
current value of the resource quantity is displayed in the
status field. The user may retain the value by depressing
the cursor reset button, or he may key in a replacement
decimal value. At this point any user changes have been
made to the RAB portion of the ITIP data base, and control
is returned to the prompt mode.

3.5.21 Terminate ITIP

Mnemonic: STOP

Description: This user option allows the network designer
to terminate an ITIP design session and return to the IGDS
graphics subsystem.

Procedure: No additional user responses are required by
this option.

3.6 Logging Off

Once the user has selected the STOP option under ITIP, the status field displays ITIP TERMINATED. The user is now in the graphics subsystem of IGDS, and he should then simultaneously depress the CTRL (Control) key on the keyboard and the "Z" key followed by the return key. The system will once again respond with the choice of subsystems, and the user may now log off by keying in BYE. The BYE subsystem will log the user off, close out all accounting activities, and prepare the design station for the next user to log on.

APPENDIX A

ITIP USER OPTION SUMMARY

Appendix A contains a definition of the user options available to the ITIP operator and the required responses for each command. A / between responses indicates the operator may choose either response, and bracketed responses indicate that the response or series of responses are repeated. The information given for each option is:

OPTION   - A brief description of the option.

MNEMUNIC   - The character string used to
                  identify the option to be executed.

RESPONSES   - Required responses for completion
                  of the user option where:

                  D = data point (cursor)

                  K = key-in (keyboard)

                  R = reset (cursor)

USER OPTION SUMMARY

Option	Mnemonic	Responses
Place Node	PN	[D/R, K,K,K,K]
Place Edge	PE	[D/R, D/R]
Delete Node	DN	[D/R]
Delete Edge	DE	[D/R]
Define Resource	DR	[K/R]
Modify Resource	MR	[K/R]
Update Drawing	UP	
Modify Node Description	MN	D/R, K/R, K, K/R, K/R
Specify Project Description	SP	[K/R]
Modify Project Description	MP	[K/R]
Submit Trap File	SF	
Zoom In	ZI	
Zoom Out	ZO	
Redefine Window Center	WC	D/R
Default Window Center	DC	
Expand Node	EX	D/R
Return to Previous Level	PL	
Return to Master Level	ML	
Define Resource Activity	DA	K/R, K/R, K/R, D/R
Modify Resource Activity	MA	K/R, D/R, K/R, K/R
Terminate ITIP	STOP	

APPENDIX B

CREATING THE ITIP CELL LIBRARY

Appendix B outlines the steps to create the ITIP.CEL
cell library and to enter the arrowhead symbol in that library.
After the user logs onto the system the following is displayed:

```
>@ LOGIN
>; ***** INTERACTIVE *** GRAPHICS *** DESIGN *** SYSTEM *****
>; WHAT DO YOU WANT TO USE -
>; UTILITIES, GRAPHICS, EDIT, DMRS, HELP, BYE
>* ? [S]
```

The user should choose the utilities subsystem by keying in
UTI. The choice of utilities is then displayed.

```
>; WHICH UTILITY WOULD YOU LIKE TO USE -
>; COPY, CREATE, DELETE, DIRECTORY, HELP, INCREASE, REDUCE
>*    ? [S]
```

The user should choose the create utility by keying in CRE.
The system then prompts with:

```
>* WHAT IS THE NAME OF THE NEW DRAWING? [S]
```

The user should respond by keying in ITIP.CEL. The system
then prompts with:

```
>* 2D OR 3D? [S]
```

The user should respond with 2D. The system then prompts with

```
>* HOW LARGE SHOULD IT BE? [S]
```

The user should specify 25 blocks. The system will respond with:

```
SYSTEM SEEDFILE WILL BE USED
SUCCESSFUL COMPLETION
```

indicating successful creation of the ITIP.CEL file. The system
will again display the utility selection menu.

```
>; WHICH UTILITY WOULD YOU LIKE TO USE -
>; COPY, CREATE, DELETE, DIRECTORY, HELP, INCREASE, REDUCE
>*    ? [S]
```

The user should respond by simultaneously depressing the CTRL key
and the letter Z to exit the utilities subsystem.

At this point a new cell library file ITIP.CEL has been
created, and the user is now ready to create and to enter the
arrowhead symbol into the cell library. To do this the user brings
up the IGDS menu by keying in @LOGIN. The system responds
with:

```
>; ***** INTERACTIVE *** GRAPHICS *** DESIGN *** SYSTEM *****
>; WHAT DO YOU WANT TO USE -
>; UTILITIES, GRAPHICS, EDIT, DMRS, HELP, BYE
>*    ? [S]
```

The user should now request the graphics subsystem by keying
in GRA, USER.DGN where USER.DGN may be any current design
file. When the graphics subsystem is active the user must
key in:

NC = QS2:[50,2]ITIP.CEL

to identify the ITIP.CEL file as the new cell library. The
user must then key in:

UC = QS2:[50,2]ARO

to invoke the user command which draws the arrowhead symbol,
creates a cell with the point of the arrowhead defined as its
origin, and adds that cell to the ITIP.CEL cell library.
The command and prompt fields will display GENERATE ARROW
and GIVE DATA POINT, respectively. The cursor is now active
and the user should respond placing the cursor near the middle
of the screen and depressing the data button. The arrowhead
will be drawn automatically, added to the library and erased.
The input/error field will display OPERATION COMPLETE and
control will be returned to the graphics subsystem.

The user may now verify that the arrowhead is in the
ITIP.CEL cell library. With the cursor command button he
must select DESIGN OPTIONS from the IGDS menu. The display
in Figure A.1 will appear on the screen. With the cursor
command button he should select the @ following the UPDATE/
REVIEW CELL LIBRARY option. The display in Figure A.2
will appear on the screen. With the cursor command button
he should select the @ following the REVIEW CELL LIBRARY
option. The display in Figure A.3 will now appear on the
screen. The cell named ARO is the arrowhead. The user can
now exit by selecting RETURN TO PRIOR LEVEL @ to return
to the display in Figure A.2. The user should select RETURN
TO PRIOR LEVEL @ to return to the display in Figure A.1. The
user should select the BEGIN/CONTINUE PROCESSING @ to return to
the graphics subsystem and then simultaneously depress CTRL
and the letter Z to exit the graphics subsystem.

DESIGN PARAMETER SPECIFICATION

IGDS ALLOWS THE USER TO CONTROL VARIOUS DESIGN PARAMETERS. DEFAULT
VALUES HAVE BEEN DEFINED FOR EACH PARAMETER. HOWEVER THE USER MAY
ALTER ANY OF THESE PARAMETERS BEFORE BEGINNING HIS DESIGN OR REDEFINE
THEM AT ANY TIME DURING HIS DESIGN.

REVIEW/CHANGE LEVEL SYMBOLOGY   @
DEFINE DESIGN WORKING UNITS   @
DEFINE READOUT UNITS/ROUND-OFF   @
DEFINE ANGLE FORMAT/MODE   @
DEFINE ANGLE OR SCALE ROUND-OFF   @

UPDATE/REVIEW CELL LIBRARY   @
DEFINE THE ACTIVE CELL LIBRARY   @

UPDATE/REVIEW USER COMMAND INDEX   @
DEFINE COMMAND INDEX/DMRS DATA BASE   @

CURSOR -- BLINKING/NON-BLINKING   @
AUDIO RESPONSE ON/OFF   @

SPECIAL APPLICATION OPERATIONS   @

BEGIN/CONTINUE DESIGNING   @

Figure A.1 Design Parameter Specification Menu

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CELL LIBRARY

ADD CELL TO LIBRARY

TO ADD THE CELL DEFINED VIA THE FENCE AREA TO THE LIBRARY AND MAINTAIN
FOR SUBSEQUENT RECALL, ENTER THE CELL NAME(A), AND CELL DESCRIPTION(B)
FOR THE DESIRED TYPE CELL.

ADD NORMAL CELL $\overline{AAAAAA\overline{BBBBBBBBBBBBBBBBBBBBBBBBB}}$

ADD POINT CELL $\overline{AAAAAA\overline{BBBBBBBBBBBBBBBBBBBBBBBBB}}$

ADD MENU CELL $\overline{AAAAAA\overline{BBBBBBBBBBBBBBBBBBBBBBBBB}}$

DELETE CELL FROM LIBRARY

TO DELETE A CELL FROM THE LIBRARY, ENTER THE CELL NAME _____

RENAME CELL IN LIBRARY

ENTER THE OLD CELL NAME(A) AND THE NEW CELL NAME(B).

$\overline{AAAAAA\overline{BBBBB}}$

REVIEW CELL LIBRARY   ●

RETURN TO PRIOR LEVEL   ●

Figure A.2 Cell Library Menu

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R E V I E W   C E L L   L I B R A R Y

NAME   DESCRIPTION   TYPE   SIZE

ARO   ARROWHEAD   P   0.87

TOTAL SECTORS. WORDS IN USE=   0.112

RETURN TO PRIOR LEVEL -- 0   TURN PAGE -- 0

Figure A.3   Review Cell Library Display

APPENDIX C

ITIP INSTALLATION CONSIDERATIONS

This appendix contains a summary of things that should be considered when installing the ITIP.

The ITIP consists of user commands and FORTRAN tasks. Many of the user commands invoke other user commands. To invoke a user command, the device, UIC, and user command name must be specified. The device and UIC cannot be made dynamic and, therefore, have been hard coded to QS2:[50,2]. To install ITIP on another device or in a different account would require software changes.

The ITIP software was developed using IGDS version 8.3 and DMRS version 8.1.5. If it is desired to use ITIP with versions of IGDS or DMRS other than these an upgrade of ITIP may be necessary.

The limits of the database for the number of RDB's, EDB's, RAB's and NDB's are as follows:

    RDB's   4096 RDB's

    EDB's   4096 EDB's

    RAB's   4096 RAB's

    NDB's   9999 NDB's

These are only ITIP limits. The TRAP limits should be consulted so that networks will not be generated that cannot be analyzed by TRAP.